

Aligning to Learning Standards: An Introduction to a Balanced Math Classroom

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Access to general curriculum

- Where did this idea originate?
- Why has this idea persisted?
- Is there any research to support it?
- What happens to functional life skills?

IDEA 1997

- ALL students have access to general curriculum content
- ALL students are assessed on state standards (Creation of the Illinois Alternate Assessment)
- All?
- Content?
- What is an alternate assessment?

No Child Left Behind

- Schools accountable for ALL students
- AYP in language arts/reading, math and science
- Did you say ALL?
- Schools are accountable?

NCLB Regulations/ Guidance

- AYP: may use alternate assessment standards for up to 1% of Students with significant needs
- These standards must be based on academic content linked to grade level
- Really reading?
math? Science?

Alignment of instruction to learning standards, what promoted it?

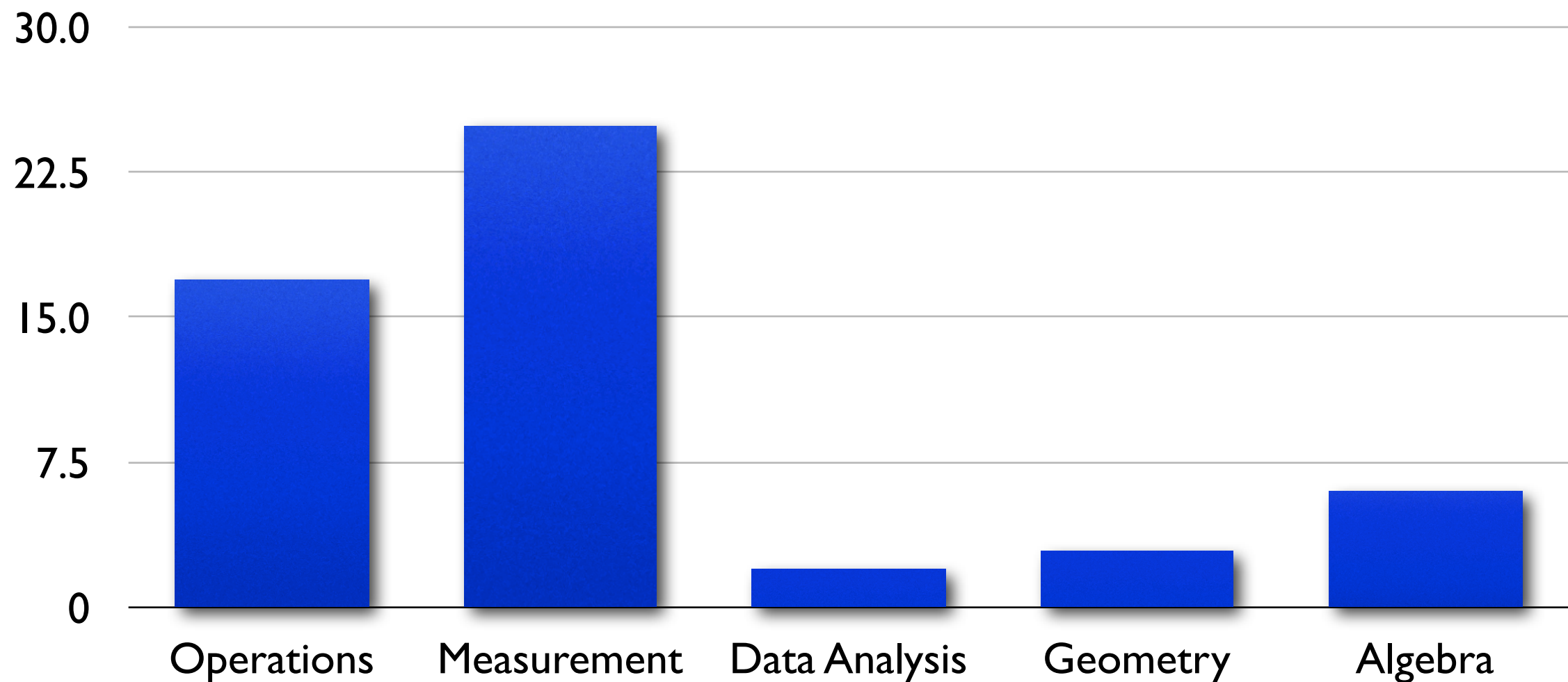
- A national focus on reading, math and science ...
- Including all students
- Schools reporting AYP

Student achievement happens when ...

- Students are engaged
- Students understand

Math: Focus on Money

Literature Review Categories for Math
67 experiments (65 articles)



Browder, D., Spooner, F., Ahlgrim-Dezell, L., Harris, A. & Wakeman, S (2006). A comprehensive review of research to teach math to students with significant cognitive disabilities. *Exceptional Children*.

Academics vs. Life Skills

- Both can be taught; both are important
- Academics can be taught in ways that are meaningful
- We do not know what students can learn until we try teaching the content
- Life skills are not a prerequisite to learning academics
- Students who are not disabled do not have to master all life skills to be eligible to learn to read; double standard
- Balance is needed in planning IEPs and developing daily schedule

Teaching to NCTM Standards: What really works?

- 5 Component Skills

- Number and Operations
- Geometry
- Algebra
- Data Analysis
- Measurement

- 5 Processing Skills

- Problem Solving
- Reasoning & Proof
- Communication
- Connections
- Representation

NCTM Principals of Math Instruction

- Equity

- Curriculum

- Teaching

- All students must have opportunity and support to learn mathematics
- Coherent, focused on important mathematics, well articulated across the grades . . prepare students to solve problems across settings
- Selecting suitable materials, tools, techniques to support learning & pursuing continuous self improvement

NCTM Principals of Math Instruction

- Learning

- Build new knowledge from prior knowledge: students learn more and better when they take control of their learning

- Assessment

- Integral part of instruction ...guides student learning

- Technology

- Technology is essential in teaching and learning

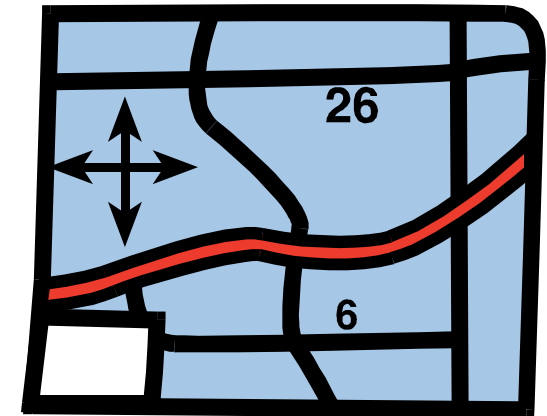
Number Sense

- Identify numbers
- One-to-one correspondence
- Place Value
- Numerical order
- Numbers can be:
 - Numerals
 - Objects
 - Manual Sign
 - Pictures

Embedded into all components of Math Instruction

Geometry

- Not just shapes
- Directional vocabulary
- Drawing line between two points
- Street maps - points in a plane

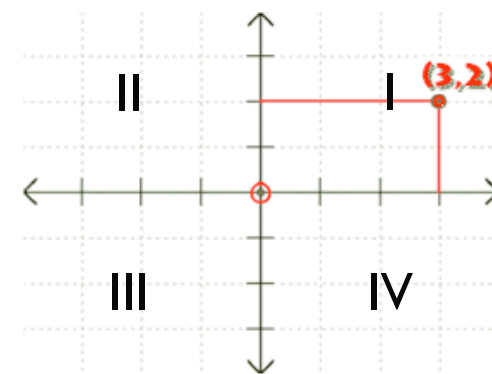


Geometry

- Elementary
 - Identify shapes
 - Describe spatial relationships
 - Introduce use of a coordinate system
 - Spatial reasoning

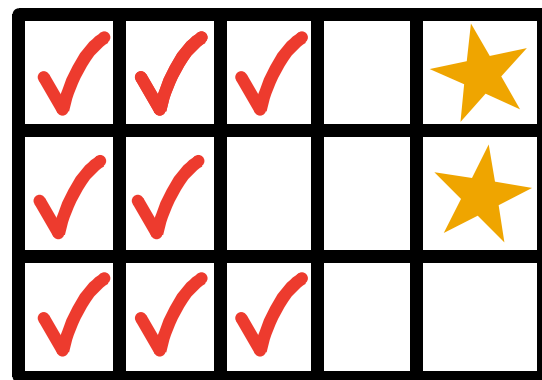
Geometry

- Middle and High School
 - Properties of figures
 - Spatial reasoning through use of coordinate plane
 - Use of coordinate plane to solve problems



Data Analysis

- Count and record own behavior
- Tally and compare attributes of our class
(number of boys vs. girls)
- Bar graph for canned food drive



Vocabulary of Data Analysis

- Introduce the “Y” axis, “This is the Y axis, it runs vertical (up and down).”
- Introduce the “X” axis
- Common Terms:
 - Votes
 - Most
 - Winner
 - Data

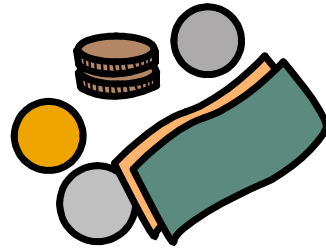
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Algebra

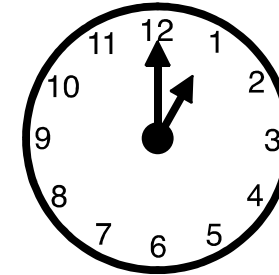
- Patterns and sequences
- Linear equations
- Using symbols for unknown numbers (solve for x)

Measurement

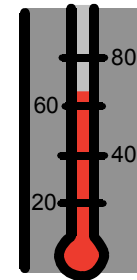
- Money



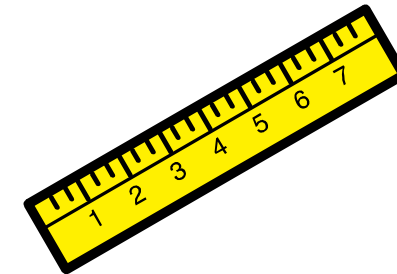
- Time



- Temperature



- Distance



- Length

- Weight



Problem Solving

Principals and Standards of School Mathematics - NCTM (2000)

- Build new mathematical knowledge through problem solving
- Solve problems that arise in mathematics and in other contexts
- Apply and adapt a variety of appropriate strategies to solve problems
- Monitor and reflect on the process of mathematical problem solving

Problem Solving Strategies

- Act Out or Use Objects
- Use or Make a Picture or Diagram
- Make an Organized List
- Use or Make a Table
- Guess and Check
- Write a Number Sentence
- Use or Look for a Pattern
- Work Backwards
- Use Logical Reasoning
- Make it Simpler
- Brainstorm
- Use A Formula

Reasoning and Proof

Principals and Standards of School Mathematics - NCTM (2000)

- Recognize reasoning and proof as fundamental aspects of mathematics
- Make and investigate mathematical conjectures
- Develop and evaluate mathematical arguments and proofs
- Select and use various types of reasoning and methods of proof

Communication

Principals and Standards of School Mathematics - NCTM (2000)

- Organize and consolidate their mathematical thinking through communication
- Communicate their mathematical thinking coherently and clearly to others
- Analyze and evaluate the mathematical thinking and strategies of others
- Use the language of mathematics to express mathematical ideas precisely

Communication

What is math communication?

- Written (Journals, extended response, etc.)
- Verbal - Math Talk (student-teacher, partners, teacher led small group, student cooperative small group, whole class)
- Demonstration

Mathematics is a language

Connections

Principals and Standards of School Mathematics - NCTM (2000)

- Recognize and use connections among mathematical ideas
- Understand how mathematical ideas interconnect and build on one another to produce a coherent whole
- Recognize and apply mathematics in contexts outside of mathematics

Representation

Principals and Standards of School Mathematics - NCTM (2000)

- Create and use representations to organize, record, and communicate mathematical ideas
- Select, apply, and translate among mathematical representations to solve problems
- Use representations to model and interpret physical, social, and mathematical phenomena

Representation

- Begin with concrete (manipulatives)
- Concrete & symbolic (manipulatives with visual)
- Symbolic & numerical (visual with number sentence)
- Abstract (Numerical expressions/Algebraic equations)

Pre-Assessment

- Background knowledge, skills and understanding
- Knowledge, understanding, and skill for an upcoming unit
- Interest
- Learning Preferences

Tomlinson, C. 2008 Defensible differentiation: what would it take to get it right?

Pre-Assessments

- Concept Maps
- Knowledge Rating
- K-W-L
- Yes/No Cards
- Brainstorming
- Surveys
- Quizzes
- Inventories

Math Inventory

Name: _____ Date: _____

1. How do you feel about math?
2. Do you think you are good in math? Why?
3. What are your best areas in math?
4. What are your weakest areas in math?
5. Do you think it is important to be good in math? Why?
6. What do you think are characteristics of students who are good in math? Why?
7. What do you do when you come to a math problem you can't solve?
8. How do you use math outside of class?
9. What do you usually do after school when you get home?
10. What do you most like to do when you have free time? Why?
11. What else should I know about you to teach you effectively this year?

On-Going Assessment:

- Checking to see if all students:
 - know what they should
 - understand
 - can do what they should
- Use to adjust instruction when any of them do not - or are not ready to move ahead.

Common Formative Assessments

- Future Goal
- ISAT Focus and IAA Focus (Reading is beginning to form this)
- This year ED/LOP Progress Monitor Tool being used (Aimsweb)
- Progress Monitoring Tools being researched

How do we do all of this?

- Meet IEP Goals
- Meet AYP
- Individualize
- Differentiate
- Teach things in a way that we may never have learned

A Balanced Math Approach:

- Computation
- Teacher Modeling
- Small Group Problem Solving and Skill Work
- Independent Math Work
- Cooperative Problem Solving
- Stations

Balanced Literacy & Balanced Math

How are they alike?

- Word Work
- Independent Reading/Writing
- Read/Write Aloud
- Shared Reading/Writing
- Guided Reading/Writing
- Centers
- Computation
- Independent Math Work
- Teacher Modeling
- Cooperative Problem Solving
- Small Group Problem Solving and Skill Work
- Stations

Computation (Daily)

- 10 minutes a day review
- Number Sense focus
- Games, Interactive lessons, Worksheets
- Scaffold Computational Skills for each student

Computation (Math Fluency)

- Number Recognition
- One-to-One Correspondence
- Counting
- Addition, Subtraction, Multiplication, Division

Teacher Modeling

- Daily
- Beginning of lesson (introductions)
- Read A Loud (Marilyn Burns Series)
- Based on the SEDOL Curriculum Frameworks

Small Group Problem Solving and Skill Work

- Daily
- Based on on-going assessments
- Flexible groupings
- Work on skills with teacher at their instructional level
- Based on the SEDOL Curriculum Frameworks

Independent Math Work

- Daily
- Practice Skills at level of independent success based on the SEDOL Curriculum Frameworks

Cooperative Problem Solving

- Three times a week
- Small groups of students
- Students challenged and need to solve the problems
- Teacher rotates and facilitates discussions, but does not lead to answers
- It is okay to pause activity and return to it later

Stations (Centers)

- Used in conjunction with Small Group Problem Solving and Skill Work
- Behavior management skills to make this successful need to be taught first
- Stations need to have different levels for students success (not one size fits all)

REAL WORLD APPLICATIONS

- Station Ideas:
 - Hands on Standards
 - Games

Maximizing Expectations of Student Achievement

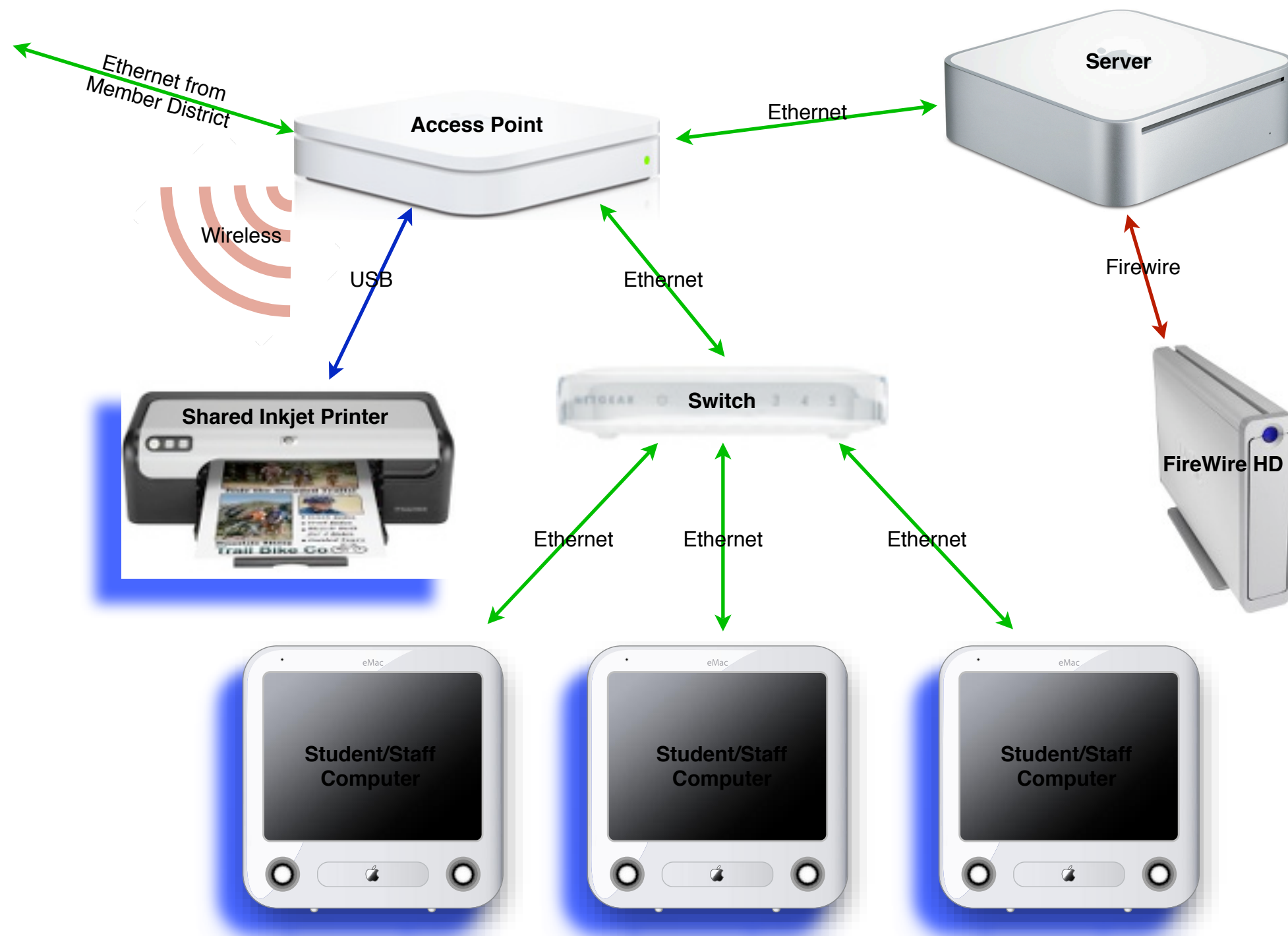
Raising Student Engagement and Achievement at
SEDOL by integrating the curriculum and technology



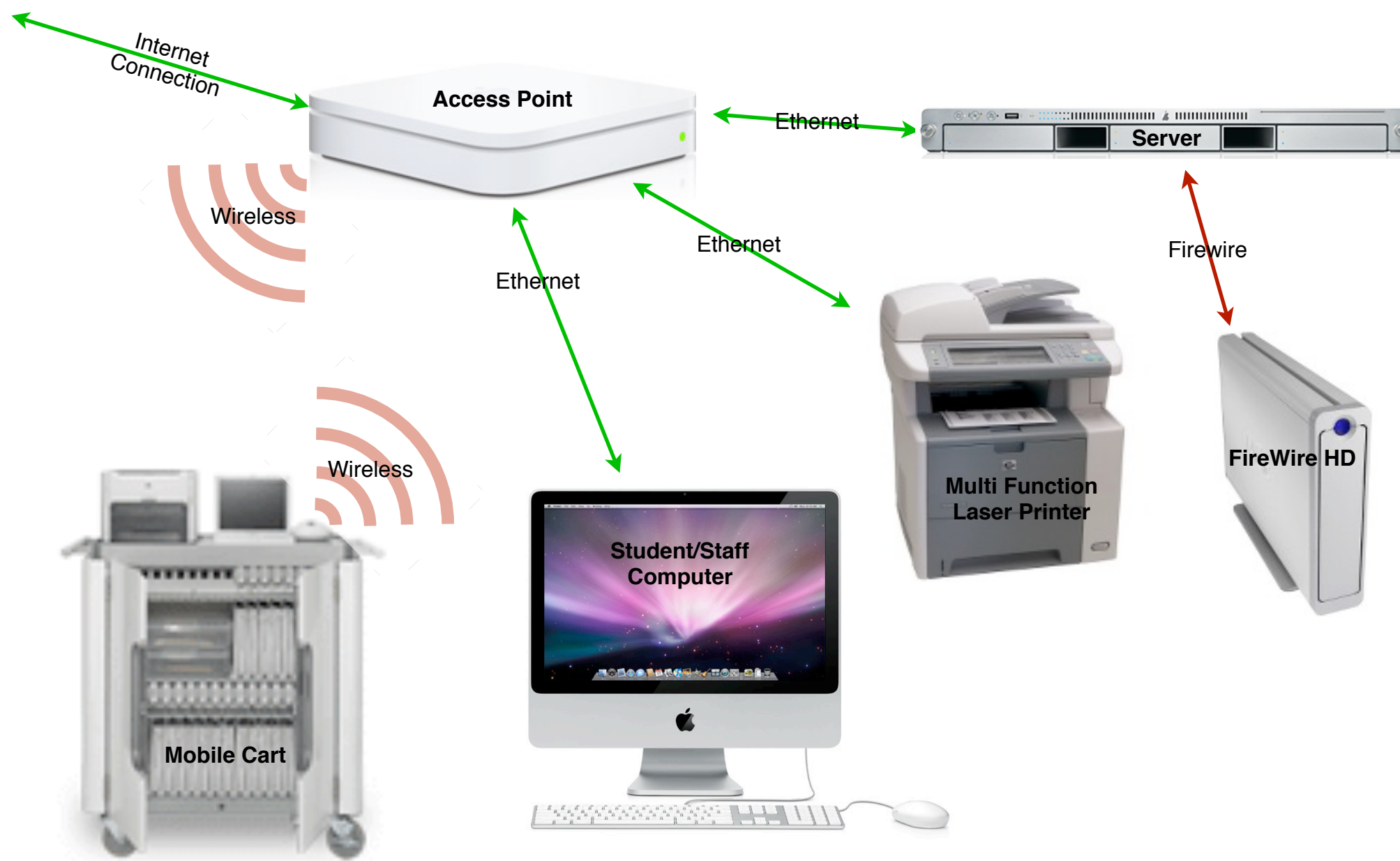
Proposed Classrooms in Centers



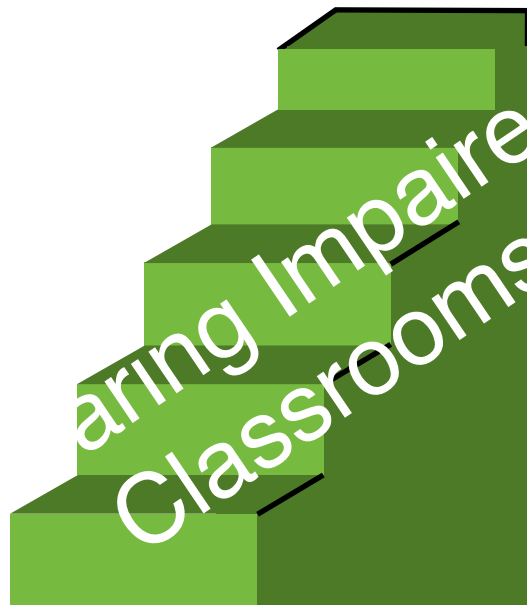
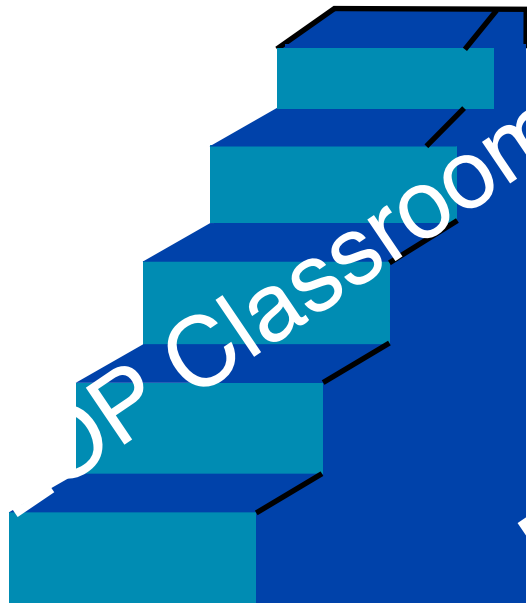
Proposed Classrooms in Sectors



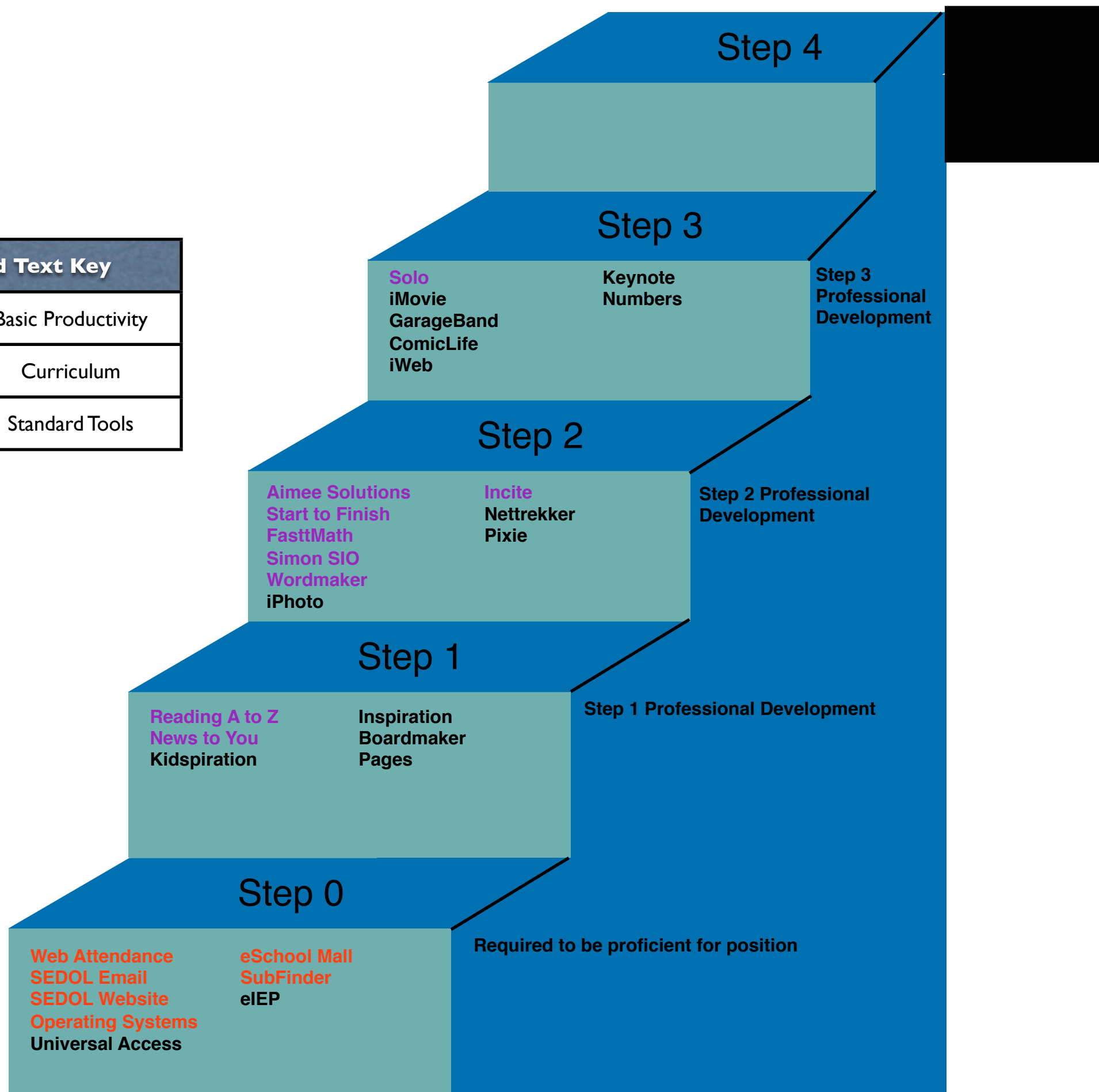
Proposed Classrooms in Transition



Professional Development



Colored Text Key	
Red	Basic Productivity
Purple	Curriculum
Black	Standard Tools



What is already there?

- Kidspiration Templates
- First Class (Intranet to share lesson plans)
- Summer Projects
 - Adapted Books for Academic Vocabulary
 - Technology Templates in subject areas

Nettrekker

- Let's all get connected with math in mind!

RESOURCES

Ainsworth, L., Christinson (2006) *Five easy steps to a balanced math program for primary grades*. Lead and Learn Press: Englewood, CO

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